

# Challenges and Opportunities of Scaling-Up Renewable Energy in West Africa



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# Presentation outline

1. Foundation of ECREEE
2. Objectives and activities of ECREEE
3. Renewable Energy potentials in West Africa
4. Benefits of RE Integration
5. Existing barriers





# Foundation of ECREEE

- The creation of ECREEE

- Directive of the 59th Session of ECOWAS Council of Ministers in Ouagadougou, November 2007, requesting the commission to re-focus its energy Access agenda towards the development of the regions vast renewable energy potential;
- The Ouagadougou Declaration from 12 November 2007 highlighted the need for a regional RE&EE Centre; initial pledge by the Austrian Minister for Foreign Affairs;
- Foundation laid by Regulation C/REG.23/11/08 of the 61st Session of ECOWAS Council of Ministers in Ouagadougou, Burkina Faso, on November 23, 2008;
- Official launch of the ECREEE preparatory phase in November 2009 with support of the ECOWAS Commission, the Austrian Development Cooperation (ADC), the United Nations Industrial Development Organization (UNIDO) and the Government of Cape Verde;
- In 2010 the Spanish Government pledged extensive support to ECREEE from 2010 to 2015;
- **Official launch of ECREEE 6July 2010**



# ECREEE objectives & activities

## Overall Objective

To contribute to the sustainable economic, social and environmental development of West Africa by improving access to modern, reliable and affordable energy services, energy security and reduction of energy related GHG emissions and climate change impacts on the energy systems;

## Specific Objective

Creation of favorable framework conditions and an enabling environment for RE&EE markets by supporting activities directed to mitigate existing barriers;

## ECREEE Activities

- Lead and coordinate the implementation of the ECOWAS/UEMOA regional action plan and White Paper on energy access by promoting RE&EE technologies and services;
- Coordination, implementation and fund mobilization for the following activity programs in cooperation with national focal points, international organizations and private sector:
  - Tailored policy, legal and regulatory frameworks and quality standards
  - Capacity building of key groups of different sectors
  - Advocacy, awareness raising, knowledge management and networking
  - Execution of renewable energy programs and projects for demonstration
  - Execution of energy efficiency programs and projects for demonstration



# ECREEE secretariat





# ECREEE Partners



Austrian  
Development Cooperation



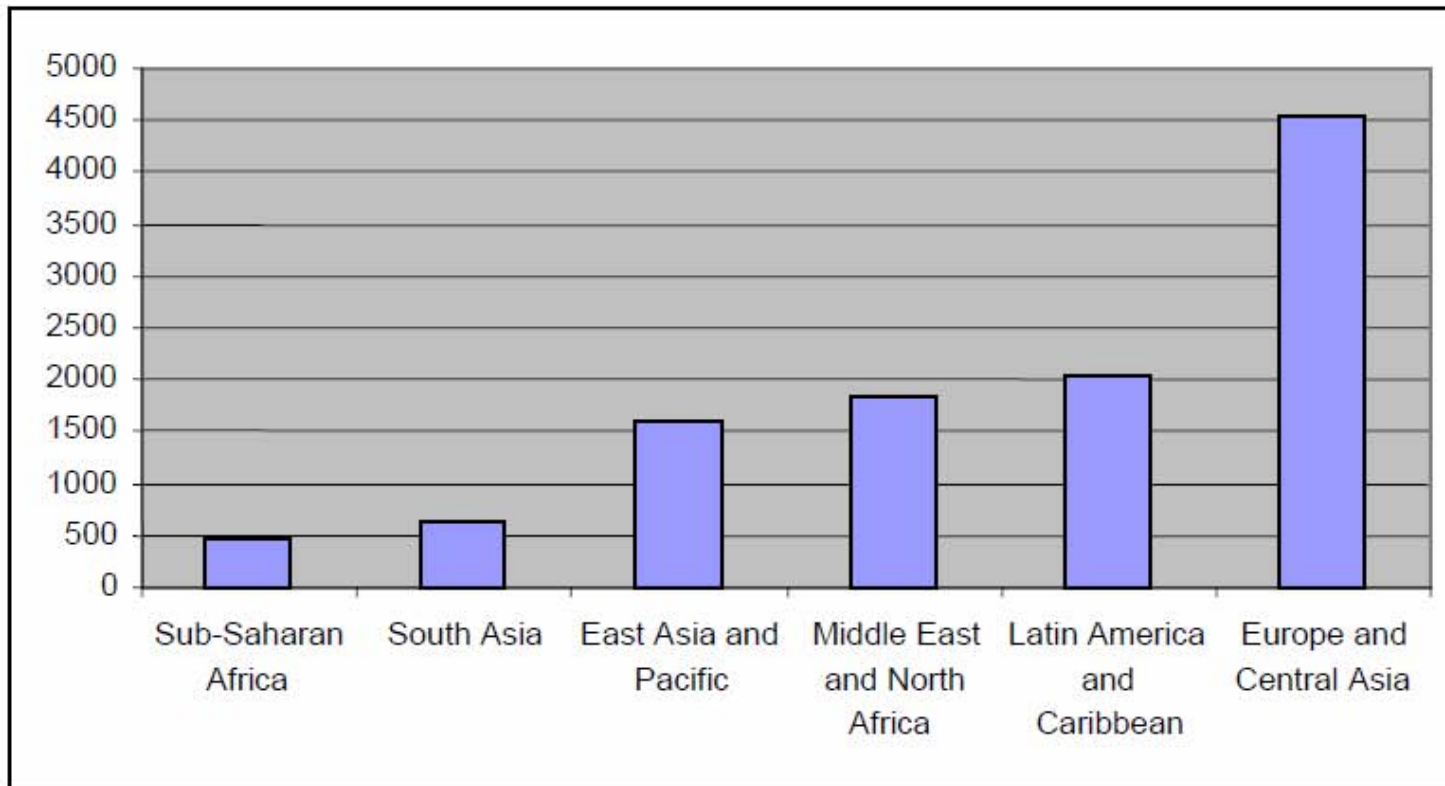


# Energy situation in West Africa

- Interrelated challenges of energy poverty, energy security and climate change mitigation and adaptation
- **Low energy consumption and service access**
  - One of the lowest energy consumption rates of the world;
  - Household access to electricity services is only around 20% (40% in urban and 6-8% in rural areas);
  - Rural areas mainly rely on traditional biomass to meet their energy requirements;
  - Electricity networks mainly serve urban and peri-urban areas; lack of decentralized systems in rural areas;
  - The poor spend more of their income for low quality energy services than better-off for better quality services
  - Energy poverty has severe impacts on the social, economic and environmental development of the region;
- **Energy security concerns**
  - High energy vulnerability of the region through fossil fuel price volatility (60 % of electricity generation from oil)
  - Gap between rising urban energy demand, available generation capacities and limited investment capital;
  - Lack of regional energy trade (region has considerable but unevenly distributed resources: e.g. gas, oil, hydro);
  - High losses in the energy systems (e.g. high energy intensity and low demand and supply side efficiency);
  - Energy crisis hampers social, economic and industrial development (e.g. cost of blackouts and load shedding)
- **Climate changes concerns**
  - Increasing energy related GHG emissions (new investments determine GHGs for the next 20 -30 years)
  - Climate change impacts vulnerable West African energy systems (e.g. water flows, extreme weather events)



**Figure 3: Annual Electricity Consumption per Capita (kWh/Capita) by Regions of the World (2004)**

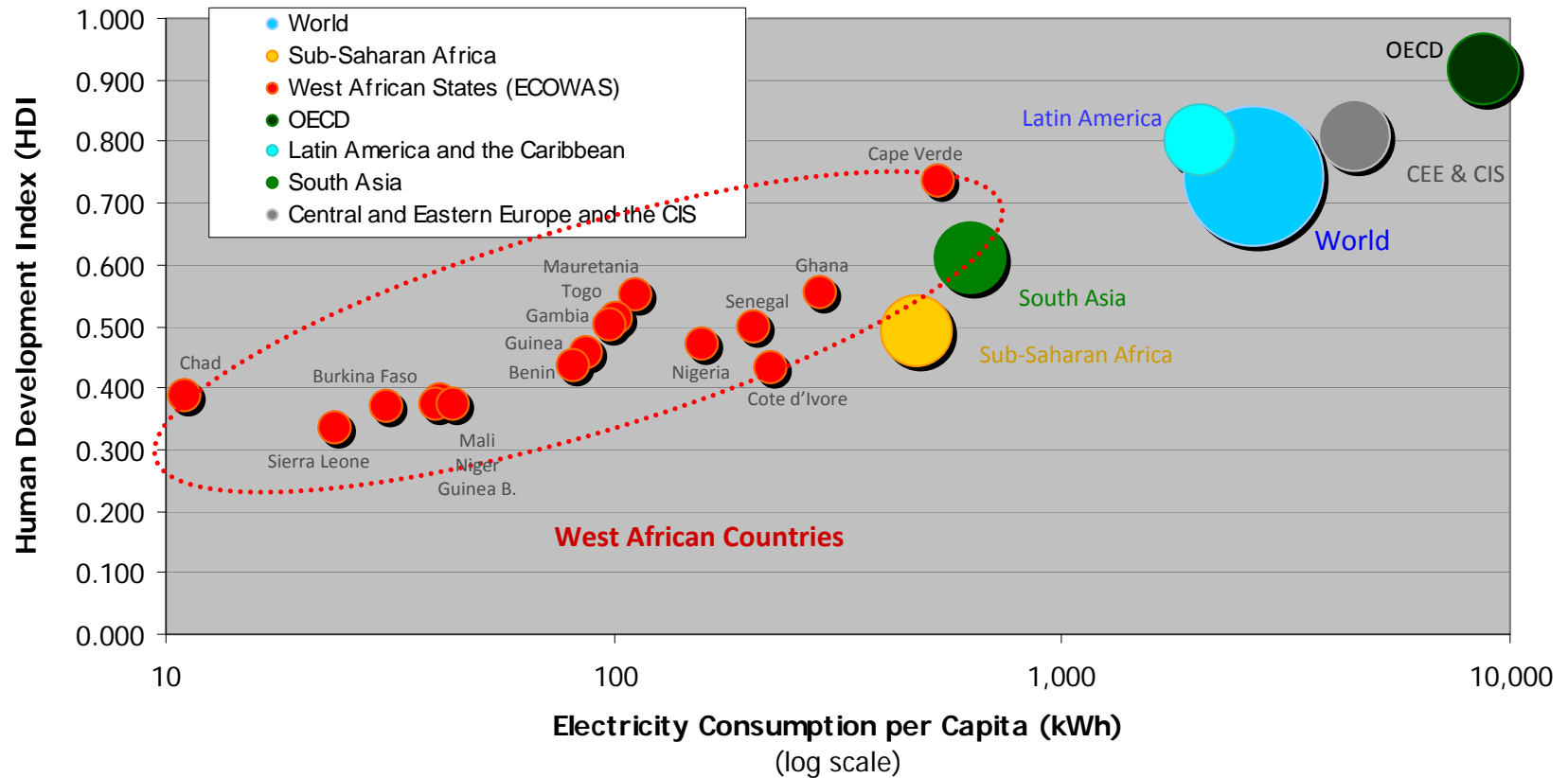


Source: UNDP, 2007

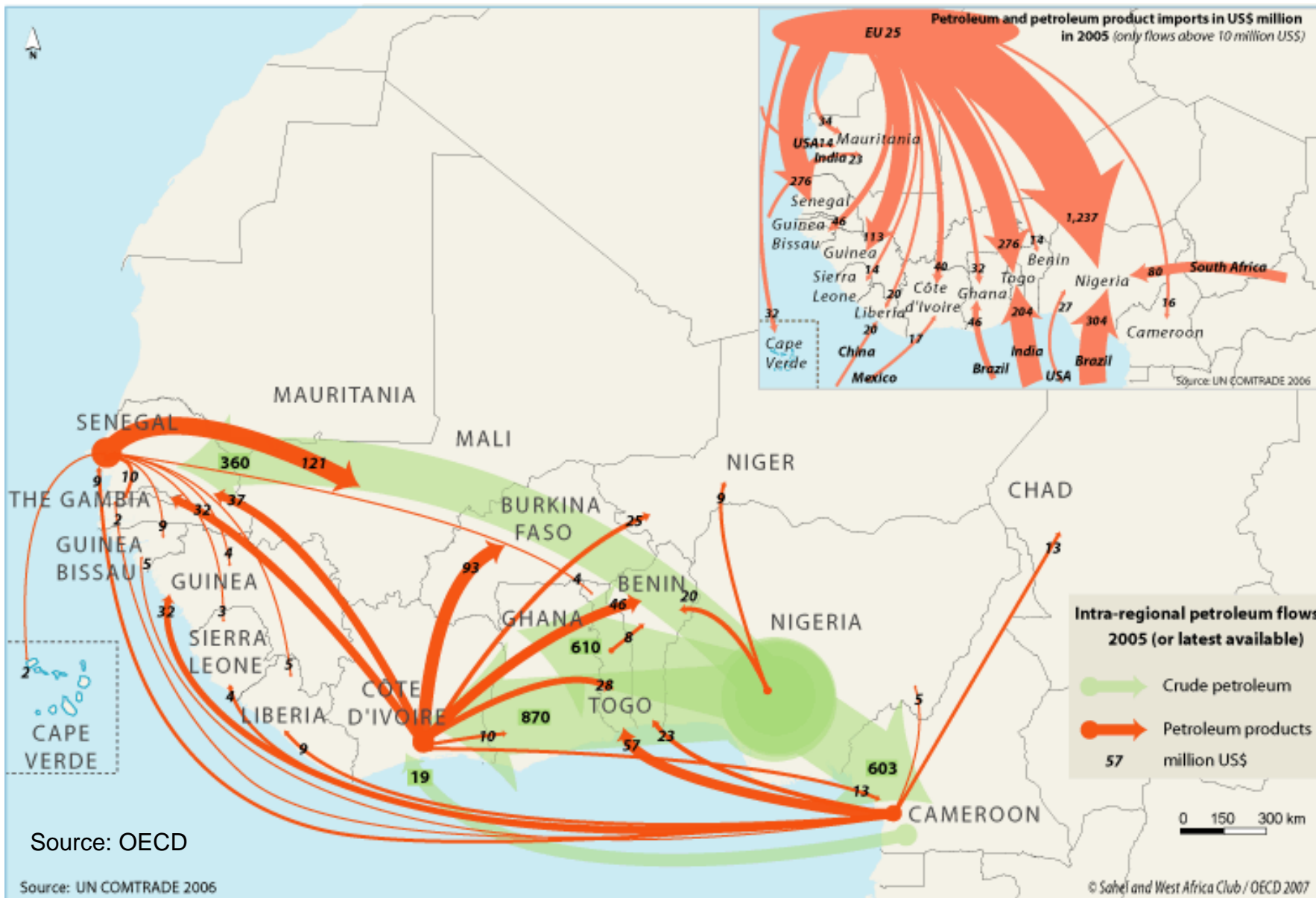




# Lack of energy and its implications for the HDI (Focus on West Africa)



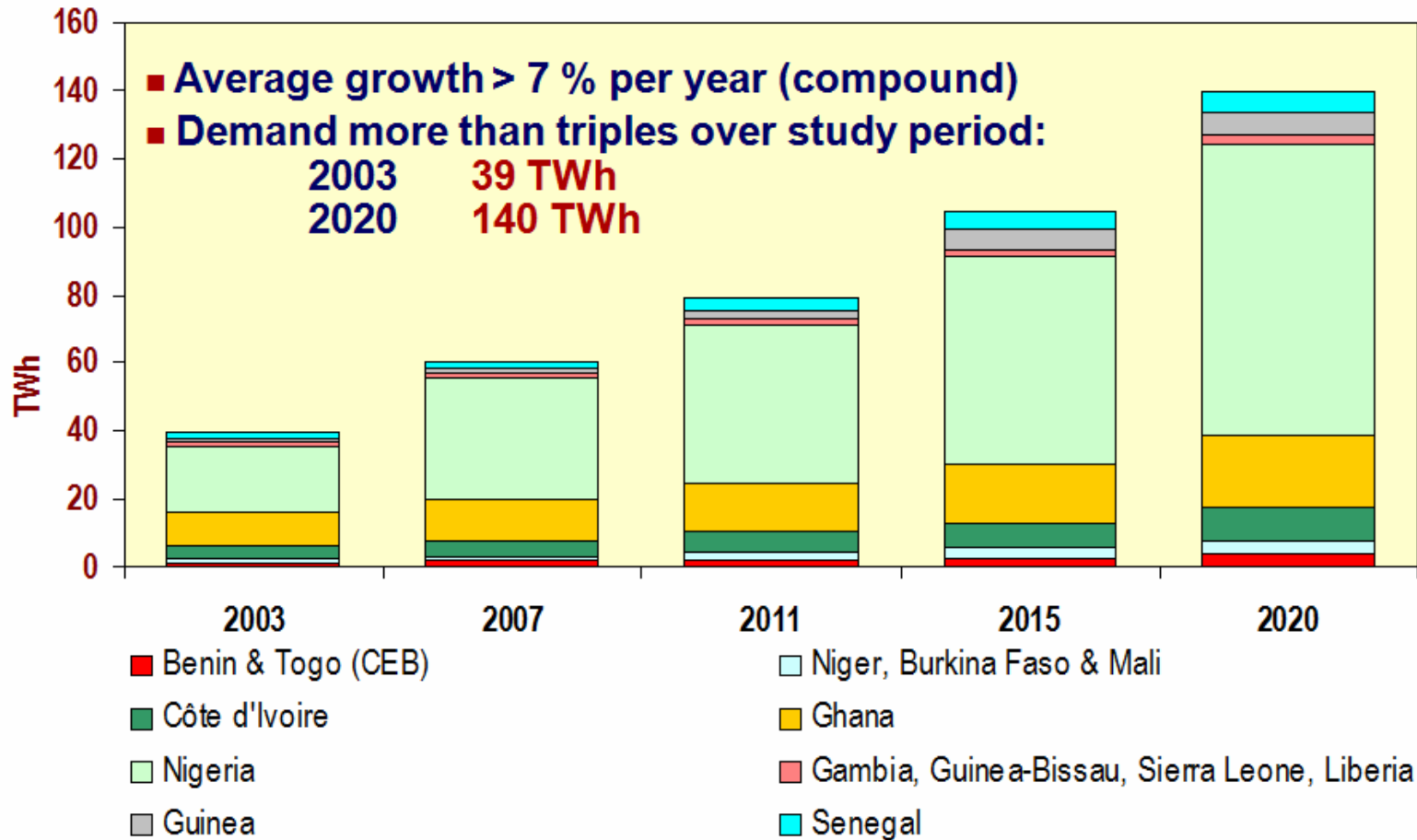
Source: UNDP – <http://hdr.undp.org/en/>



# Inter and intra-regional flows of petroleum and petroleum products in 2005

# Electricity Demand

ELECTRICITY DEMAND GROWTH IN WEST AFRICA



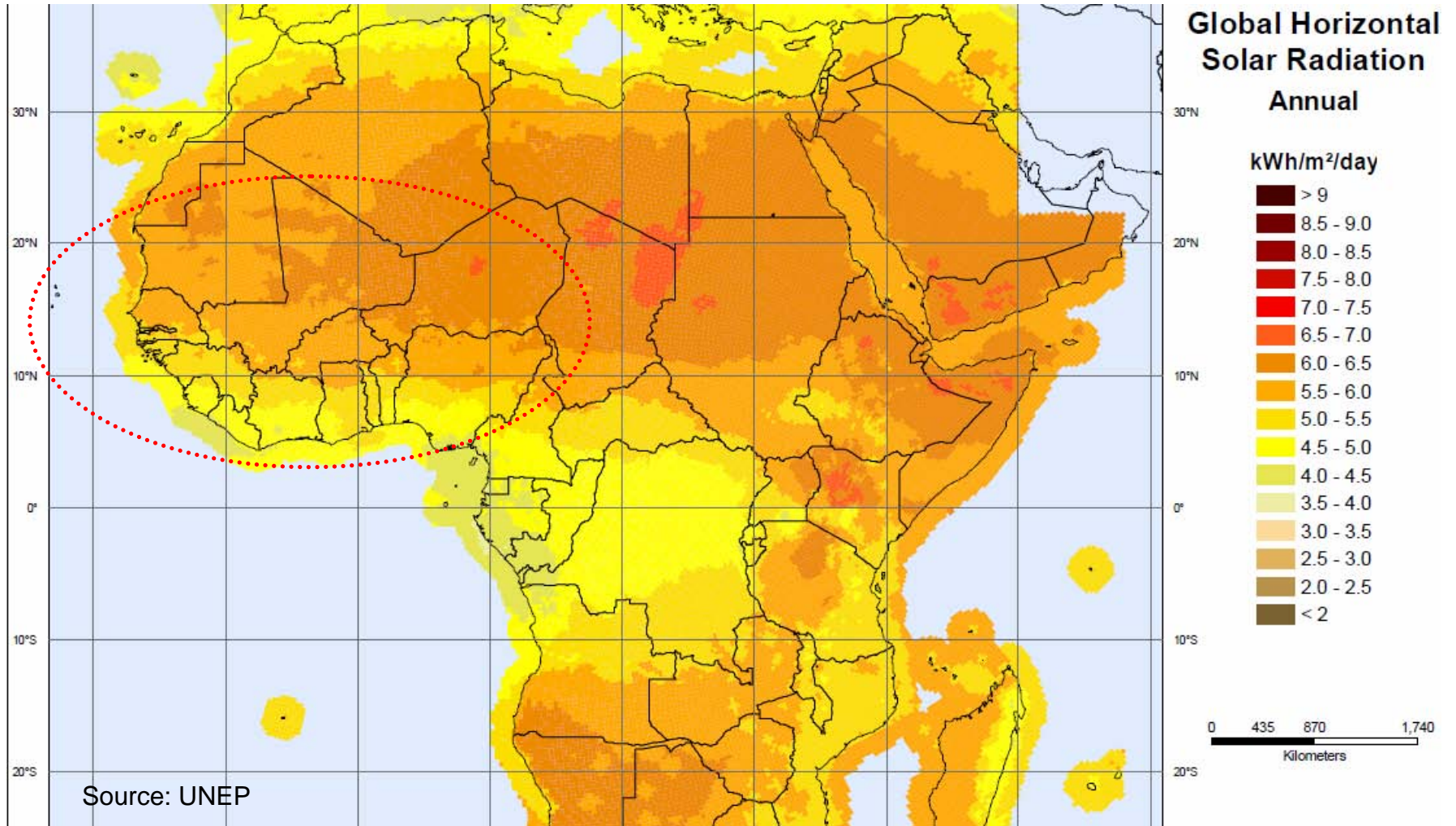


# RE & EE potentials in West Africa

- RE & EE play an important role to address the energy challenges in West Africa simultaneously
- RE potentials so far unexploited
  - 23,000 MW of feasible **large and small hydropower potential** (16% exploited);
  - Huge potential for **all forms of bioenergy** (e.g. biomass, biogas, biofuel);
  - Average **solar radiation of 5-6 kWh/m<sup>2</sup> per day** throughout the year;
  - Considerable **wind power potential** in some countries;
  - Considerable **tidal, ocean thermal and wave energy** resources in some countries;
  - RETs are particularly effective in combination with EE measures;
- EE potentials so far unexploited
  - Wide range of options to improve **supply and demand side efficiency** (including energy saving)
  - e.g. **Equipment labeling and building standards**;
  - e.g. **Cleaner production** in industry (e.g. process heat);
  - e.g. **Technical and commercial losses** in the electricity system;



# Solar potential





# Bioenergy potential





# Small hydro potential

Country	Potential small hydropower plants		Developed small hydropower plants		Gap between potential and developed plants	
	Number of sites	Total capacity	Number of sites	Total capacity	Number of sites	Total capacity
Benin	85	1 045 MW	0	1 045 MW	85	1 045 MW
Burkina Faso	70	138.8 MW	0	0	70	138.8 MW
Ghana	9	1 000 kW	0	0	9	1 000 kW
Liberia	38	1 000 MW	0	0	40	1 004.03 MW
Mali	20	115 MW	5	0.258 MW	15	114.742 MW
Niger	7	273.08 MW	0	0	7	273.08 MW
Nigeria	277	734.2 MW	3	9	274	723.2 MW
Gambia, Guinea-Bissau, Guinea, Mali, Mauritania and Senegal	9	1 140 MW	0	0	9	1 140 MW
Togo	39	224 MW	0	0	39	224 MW
<b>Total</b>	<b>554</b>	<b>5 670.08 MW</b>	<b>8</b>	<b>0.258 MW</b>	<b>548</b>	<b>5 671.85 MW</b>

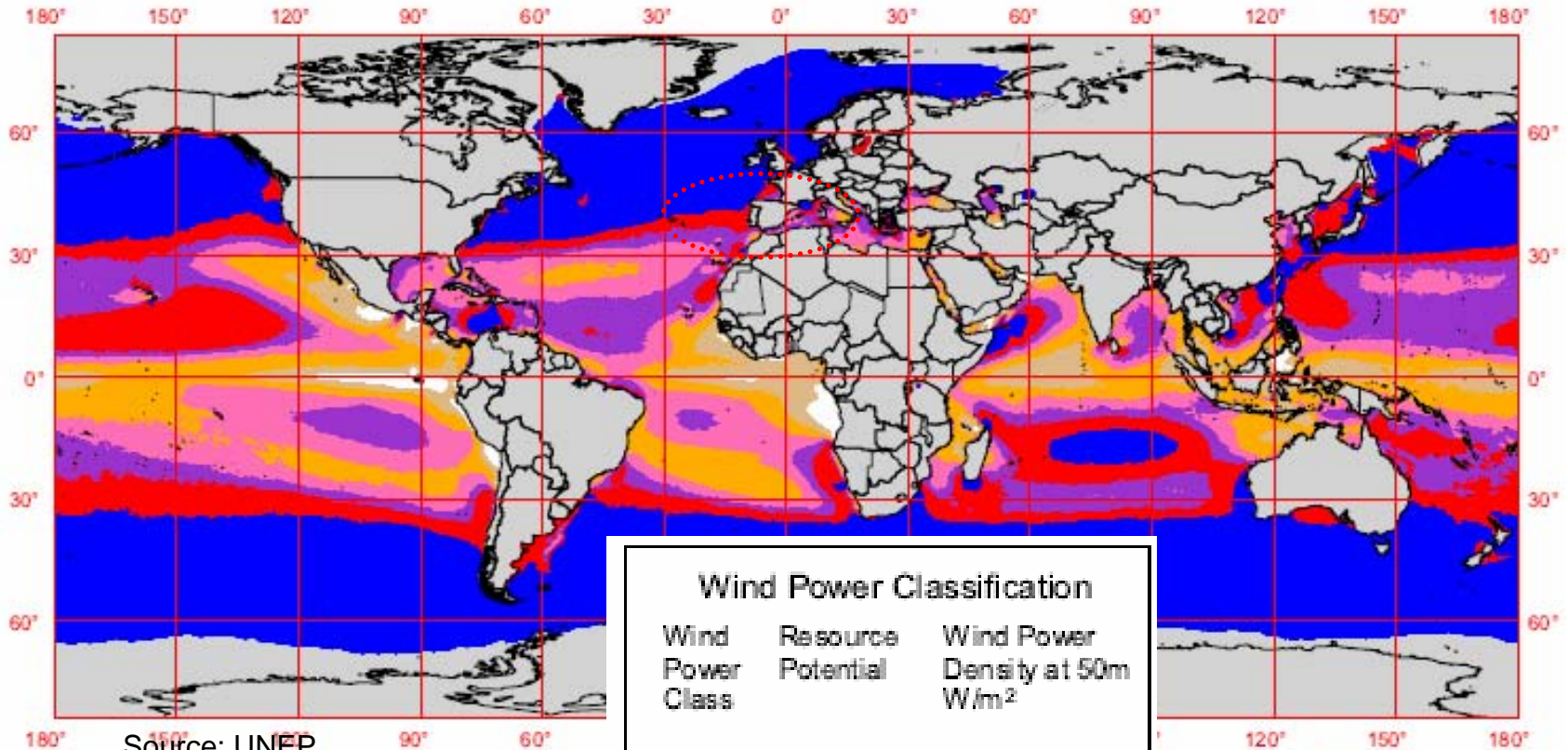
**First estimation:  
5.671 MW  
unexploited small  
hydro potential!!**

Source: UNIDO



# Wind power potential

QuikSCAT - Annual Wind Power Density at 50 m



Source: UNEP

Wind Power Classification		
Wind Power Class	Resource Potential	Wind Power Density at 50m $W/m^2$
1	Poor	0 - 200
2	Marginal	200 - 300
3	Fair	300 - 400
4	Good	400 - 500
5	Excellent	500 - 600
6	Outstanding	600 - 800
7	Superb	> 800





# Return on green investment

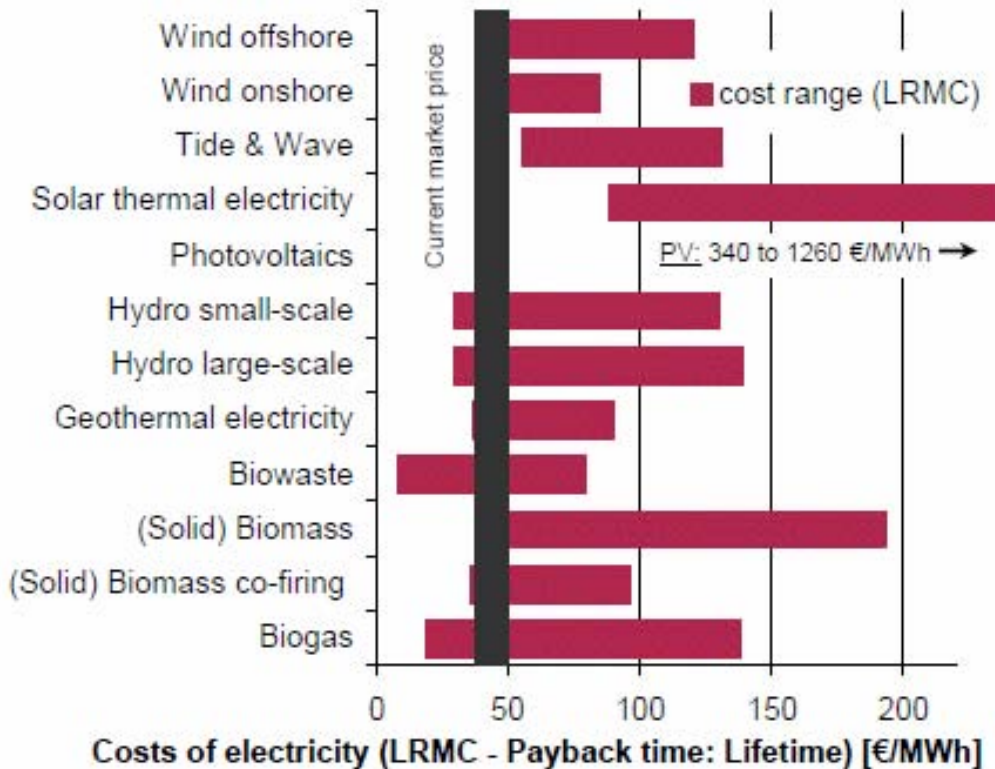
on energy system levels (...)

- **Improvement of energy security through diversification of the energy mix** and reduction of dependency on imported oil products (up to 100% of power generation from diesel)
- **Reduction of generation costs in some countries/regions**; decoupling of generation costs from price volatility of the oil market (crude oil price doubled between 2005 and 2010)
- Possible **reduction of high energy consumer tariffs in some countries/regions** (consumer tariffs are even higher in rural areas)
- Some RE technologies are already **cost-competitive options in relation to conventional options** and are able to cover the rapidly growing energy demand primarily in urban areas
- **Reduction of electricity demand** in combination with energy efficiency and saving measures (e.g. solar thermal heating, cooling and sea water desalination, labeling standards)
- Provision of **energy access to modern, affordable and reliable energy services in rural areas** with no access to centralized grid and supply chains (the majority of the rural population rely on traditional biomass ); **huge potential for decentralized RE solutions**;

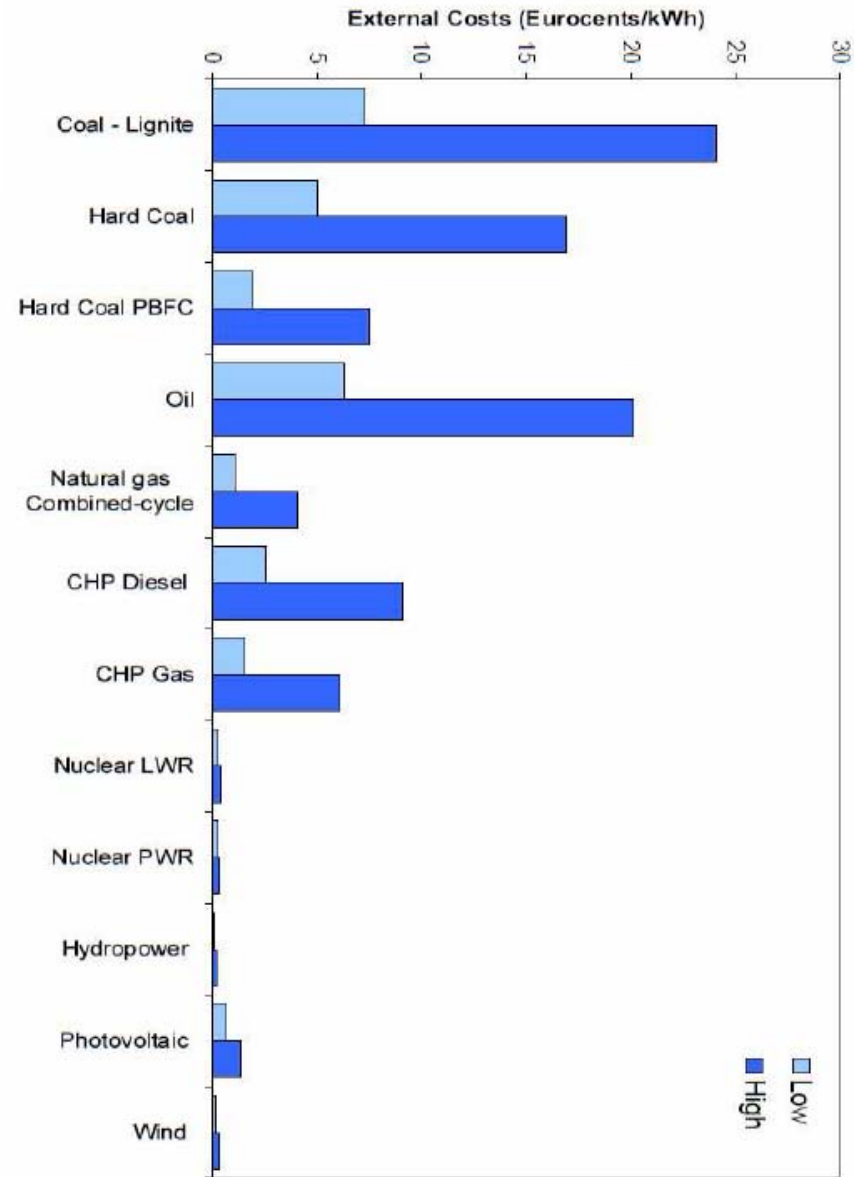


## Estimated average EU-25 external costs for electricity generation (EEA, 2005)

### Electricity generation costs of different RE technologies in EU-25 (EEG, 2007)



*...based on technology-specific lifetime*





# Return on green investment

for sustainable social, economic and environmental development (...)

- **Secure, reliable and affordable energy supplies as essential element of social and economic development** (e.g. clean water, education, health)
- **Possible reduction of the energy bill of national households** and increased state ability to invest in other sectors (health, education, industry)
- **Possible improved financial situation of utilities** and ability to reinvest in generation and transmission infrastructure (e.g. lower generation costs and improved ability and willingness to pay)
- **Increased competitiveness and productivity for companies and industry** (e.g. lower production costs, savings for hotels, no necessity for decentralized diesel generation)
- **Opportunities for private sector development and companies** (e.g. PPPs, IPPs, ESCOs); export opportunities for RE products and services (e.g. quality testing, financing)
- **Dynamic image and marketing tool** for the tourism sector (e.g. Cape Verde)



# Return on green investment

for sustainable social, economic and environmental development (...)

- **Increased efficiency and effectiveness of public institution** to deliver their services (e.g. clinics, university)
- **Direct job creation** through construction, installation and maintenance of RE infrastructure and related services (job effects differ from technology to technology)
- **Indirect job creation** in other sectors (e.g. harvesting of biomass feedstock)
- **Increased household income** opens up opportunities for other productive uses
- **Improved live conditions for poor population groups** in rural areas (access to light, reduction of indoor pollution, access to clean water)
- **Reduction of energy related negative environmental externalities** (e.g. air, water and soil pollution, degradation, deforestation)
- **Reduction of energy related GHG emissions**



# Existing Barriers for RE & EE

Various technical, economic, financial, institutional, legal and capacity related barriers for RE&EE exploitation:

- Lack of tailored RE&EE policy, legal and regulatory frameworks;
- Lack of RE & EE quality standards and appraisal tools;
- Low capacities and RE&EE knowledge base of key groups in public and private sectors;
- Lack of awareness of key groups in public and private sectors on different levels (e.g. federal, provincial); lack of advocacy and lobby groups;
- Lack of risk and investment capital and tailored financial schemes;
- Lack of technology transfer and adaptation of technologies;
- Lack of regional approaches, forums and information exchange of like-minded key groups;



www.ecreee.org

- Website in English, French and Portuguese
- Sign-up for E-Newsletters

A screenshot of a Windows Internet Explorer browser window displaying the website for the ECOWAS Centre for Renewable Energy and Energy Efficiency (ECREEE). The browser's address bar shows the URL 'http://www.ecreee.org/'. The website header features the ECREEE logo and the text: 'Regional Centre for Renewable Energy and Energy Efficiency (ECREEE)', 'Centre Régional pour les Energies Renouvelables et l'Efficacité Énergétique', and 'Centro Regional para Energias Renováveis e Eficiência Energética (CERECEC)'. Below the header is a navigation menu with links for Home, News, About ECREEE, Activities, Target Groups, Publications, Services Section, Contact, and Links. The main content area has a date of '2010/04/05' and a heading 'Welcome to the ECREEE'. The text below the heading reads: 'Welcome to the website of the ECOWAS Regional Centre for Renewable Energy and Energy Efficiency (ECREEE). The website is available in English, French and Portuguese.' This is followed by the ECREEE logo and its name in three languages: 'ECOWAS Regional Centre for Renewable Energy and Energy Efficiency', 'Centre Régional pour les Energies Renouvelables et l'Efficacité Énergétique de la CEDEAO', and 'Centro Regional para Energias Renováveis e Eficiência Energética da CEDEAO'. A sign-up prompt asks visitors to subscribe to the ECREEE e-newsletter, with input fields for 'email:' and 'name:', and a 'send' button. At the bottom of the page, there are links for 'SEARCH', 'TOP', and 'PRINT'. The browser's status bar at the bottom shows 'Concluido', 'Internet | Modo Protegido: Activado', and a zoom level of '100%'.



# Thank you! Merci! Muito obrigado!



*ECOWAS Regional Centre for  
Renewable Energy and Energy Efficiency*

*Centre Régional pour les Energies Renouvelables  
et l'Efficacité Energétique de la CEDEAO*

*Centro Regional para Energias Renováveis e  
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